Consequential LCA as Policy-Support Tool to Promote Green Concrete

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Abstract

The manufacturing of Ordinary Portland Cement (OPC), normally used as a binder in concrete production, is responsible for 5% of global carbon emissions. Potential sustainable alternatives, namely "green concretes", replace OPC with by-products coming from other industries.

1. *Which are the environmental implications of replacing OPC with other by-products ?*
2. *Which are the consequences of the introduction of green concretes into the market ?*

This work presents a Consequential Life Cycle Assessment (C-LCA) for the case of green concrete made from Stainless Steel Slag (SSS), with a focus on the Flemish market (in Belgium) for construction blocks.

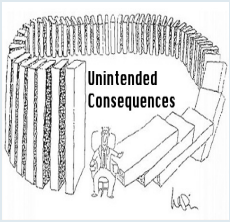
Why is C-LCA suitable to evaluate Industrial Symbiosis?

Taking into account all the changes brought in the markets, is Industrial Symbiosis beneficial in the end?

Markets react to a change in the demand or supply of a product.

An action may have indirect effects that propagate through the whole technological system, involving several product life cycle.

Consequential approach allows to anticipate the environmental consequences of an action considering also the interrelated systems



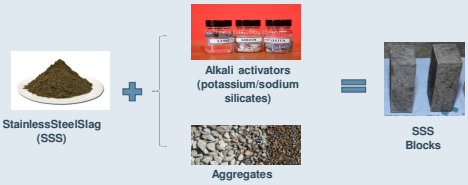
Behind C-LCA there is a decision context oriented to the assessment of the changes engendered by possible future actions:

C-LCA is more reliable to evaluate industrial symbiosis

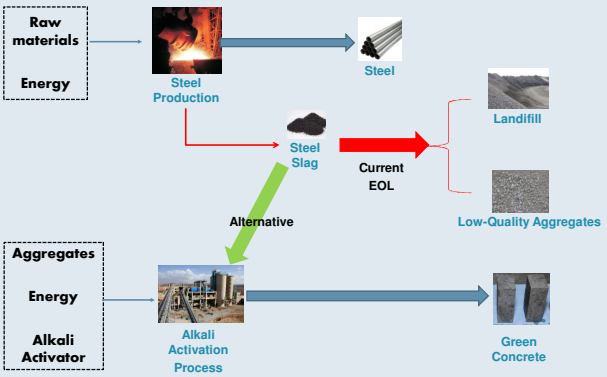
How to Activated the SSS as Construction Blocks Binder

Alkali Activation

Chemical process that transforms glassy structures into compact and well cemented composites, through chemical activation with alkali compounds



Case Study: Stainless Steel Slag as Binder in Concrete Production

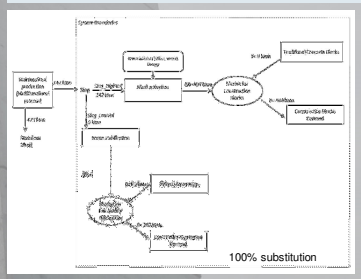


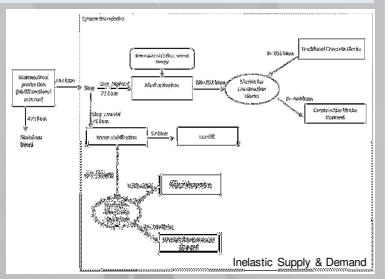
Affected Market:

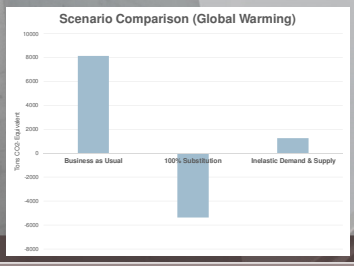
- **Market for construction materials**
- **Market for Low-Quality Aggregates**

Scenario Analysis

- **FU: Amount of SSS produced in Belgium in 2011 (142 kt)**







Conclusions

- **Complete substitution causes the lower emissions**
- **Even a partial symbiosis can lower emissions comparing to the current situation**

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